

bus or conductor must have the neutral grounded.

(b) The neutral of a dual-voltage system must be solidly grounded at the generator switchboard.

§ 111.05-17 Generation and distribution system grounding.

The neutral of each grounded generation and distribution system must:

(a) Be grounded at the generator switchboard, except the neutral of an emergency power generation system must be grounded with:

(1) No direct ground connection at the emergency switchboard;

(2) The neutral bus permanently connected to the neutral bus on the main switchboard; and

(3) No switch, circuit breaker, or fuse in the neutral conductor of the bus-tie feeder connecting the emergency switchboard to the main switchboard; and

(b) Have the ground connection accessible for checking the insulation resistance of the generator to ground before the generator is connected to the bus.

§ 111.05-19 Tank vessels; grounded distribution systems.

(a) If the voltage of a distribution system is less than 1,000 volts, line to line, a tank vessel must not have a grounded distribution system.

(b) If the voltage of a distribution system on a tank vessel is 1,000 volts or greater, line to line, and the distribution system is grounded (including high-impedance grounding), any resulting current must not flow through a hazardous (classified) location.

[CGD 94-108, 61 FR 28276, June 4, 1996, as amended at 62 FR 23907, May 1, 1997]

GROUND DETECTION

§ 111.05-21 Ground detection.

There must be ground detection for each:

(a) Electric propulsion system;

(b) Ship's service power system;

(c) Lighting system; and

(d) Power or lighting distribution system that is isolated from the ship's service power and lighting system by transformers, motor generator sets, or other devices.

§ 111.05-23 Location of ground indicators.

Ground indicators must:

(a) Be at the vessel's ship's service generator distribution switchboard for the normal power, normal lighting, and emergency lighting systems;

(b) Be at the propulsion switchboard for propulsion systems; and

(c) Be readily accessible.

(d) Be provided (at the distribution switchboard or at another location, such as a centralized monitoring position for the circuit affected) for each feeder circuit that is isolated from the main source by a transformer or other device.

NOTE TO PARAGRAPH (d): An alarm contact or indicating device returned to the main switchboard via a control cable, that allows the detecting equipment to remain near the transformer or other isolating device for local troubleshooting, is allowed.

[CGD 74-125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94-108, 61 FR 28276, June 4, 1996; 62 FR 23907, May 1, 1997]

§ 111.05-25 Ungrounded systems.

Each ungrounded system must be provided with a suitably sensitive ground detection system located at the respective switchboard which provides continuous indication of circuit status to ground with a provision to momentarily remove the indicating device from the reference ground.

[CGD 94-108, 61 FR 28276, June 4, 1996]

§ 111.05-27 Grounded neutral alternating current systems.

Grounded neutral and high-impedance grounded neutral alternating current systems must have a suitably sensitive ground detection system which indicates current in the ground connection, is able to withstand the maximum available fault current without damage, and provides continuous indication of circuit status to ground. A provision must be included to compare indications under fault conditions with those under normal conditions.

[CGD 94-108, 62 FR 23907, May 1, 1997]

§ 111.05-29 Dual voltage direct current systems.

Each dual voltage direct current system must have a suitably sensitive

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ground detection system which indicates current in the ground connection, has a range of at least 150 percent of neutral current rating and indicates the polarity of the fault.

[CGD 94-108, 61 FR 28276, June 4, 1996]

GROUNDING CONDUCTORS

§ 111.05-31 Grounding conductors for systems.

(a) A conductor for grounding a direct-current system must be the larger of:

(1) The largest conductor supplying the system; or

(2) No. 8 AWG (8.4mm²).

(b) A conductor for grounding the neutral of an alternating-current system must meet Table 111.05-31(b).

TABLE 111.05-31(B)—NEUTRAL GROUNDING CONDUCTOR FOR ALTERNATING-CURRENT SYSTEM

| Size of the largest generator cable or equivalent for parallel generators—AWG—MCM (mm ²) | | Size of the system grounding conductor—AWG(mm ²) |
|--|-----------------------|--|
| Greater than | Less than or equal to | |
| | 2 (33.6) | 8 (8.4) |
| 2 (33.6) | 0 (53.5) | 6 (13.3) |
| 0 (53.5) | 3/0 (85.0) | 4 (21.2) |
| 3/0 (85.0) | 350 MCM (177) | 2 (33.6) |
| 350 MCM (177) | 600 MCM (304) | 0 (53.5) |
| 600 MCM (304) | 1100 MCM (557) | 2/0 (67.5) |
| 1100 MCM (557) | | 3/0 (85.0) |

§ 111.05-33 Equipment safety grounding (bonding) conductors.

(a) Each equipment grounding conductor must be sized in accordance with article 250-95 of the National Electrical Code (the NEC) (NFPA 70).

(b) Each equipment grounding conductor (other than a system grounding conductor) of a cable must be permanently identified as a grounding conductor in accordance with the requirements of article 310-12(b) of the NEC.

[CGD 94-108, 61 FR 28276, June 4, 1996, as amended at 62 FR 23907, May 1, 1997]

§ 111.05-37 Overcurrent devices.

(a) A permanently grounded conductor must not have an overcurrent device unless the overcurrent device simultaneously opens each ungrounded conductor of the circuit.

(b) The neutral conductor of the emergency-main switchboard bus-tie

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must not have a switch or circuit breaker.

[CGD 94-108, 61 FR 28276, June 4, 1996]

Subpart 111.10—Power Supply

§ 111.10-1 Definitions.

As used in this Subpart:

(a) *Ships's service loads* mean electrical equipment for all auxiliary services necessary for maintaining the vessel in a normal, operational and habitable condition. Ship's service loads include, but are not limited to, all safety, lighting, ventilation, navigational, communications, habitability, and propulsion auxiliary loads. Electrical propulsion motor, bow thruster motor, cargo transfer, drilling, cargo refrigeration for other than Class 5.2 organic peroxides and Class 4.1 self-reactive substances, and other industrial type loads are not included.

(b) *Drilling loads* means all loads associated exclusively with the drilling operation including power to the drill table, mud system, and positioning equipment.

[CGD 74-125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94-108, 61 FR 28276, June 4, 1996; 62 FR 23907, May 1, 1997]

§ 111.10-3 Two generating sources.

In addition to the emergency power sources required under part 112 of this chapter, each self-propelled vessel and each mobile offshore drilling unit must have at least two electric generating sources.

[CGD 94-108, 61 FR 28276, June 4, 1996]

§ 111.10-4 Power requirements, generating sources.

(a) The aggregate capacity of the electric ship's service generating sources required in § 111.10-3 must be sufficient for the ship's service loads.

(b) With the ship's service generating source of the largest capacity stopped, the combined capacity of the remaining electric ship's service generating source or sources must be sufficient to supply those services necessary to provide normal operational conditions of propulsion and safety, and minimum comfortable conditions of habitability. Habitability services include cooking,